REMARKS

Applicant thanks the Examiner for the thorough consideration given the present application. Claims 1-26 are currently being prosecuted. The Examiner is respectfully requested to reconsider his rejections in view of the amendments and remarks as set forth below.

ABSTRACT OF THE DISCLOSURE:

The Examiner objects to the Abstract as having more than 150 words. By way of the present amendment, Applicant has reduced the number of word so that it is well below the 150 word limit.

REJECTION UNDER 35 USC §103

Claims 1-2, 6-10, 12, 14-19, 22, 23, 25 and 26 stand rejected under 35 USC §103 as being obvious over Katakura et al (5,717,421) in view of Kikuo et al (5,250,937). Claims 4, 11, 13 and 24 stand rejected under 35 USC §103 as being obvious over these two references and further in view of Marks et al (5,119,215). Claims 20 and 21 stand rejected over the original two references and further in view of Noma et al (6,184,631). These rejections are respectfully traversed.

First, Applicant notes that the patent number given for the Katakura et al reference on page 3, paragraph 5 of the action is apparently incorrect. The Examiner there used the number 5,754,154. However, on the PTO-892, this reference is properly referred to as 5,717,421. The present response is based on this understanding.

It is also noted that the Examiner rejected claims 7, 12 and 14 over the two-way combination when the claims from which they depend are rejected over a three-way combination. Applicant submits that claims 12 and 14 should have been included in the second rejection along with the

claims 11 and 13. Since the dependency of Claim 7 has now been changed to depend from claim 6, this issue is now rendered moot in regard to claim 7.

Independent claims 1, 6, 9 and 22 have now each been amended to include a description that the current controller includes a resistor and a thermistor. Claims 2, 3, 7, 12, 14, 17 and 19 have thus been amended to mirror this change in the independent claims. Claim 17 has also been amended since the term "current controller" did not have antecedent basis.

The Examiner states that the Katakura et al reference teaches a charge characteristic compensating circuit for a liquid crystal display panel having plurality of cells arranged at intersections between data lines and gate lines which control a light transmissivity in response to data signals from data lines and a plurality of switches acting in response to signals on gate line. The circuit includes a voltage supply, a gate line driver and a current controller. Applicant disagrees with the Examiner's understanding of the reference.

While admittedly the reference shows a display panel having cells arranged in intersections between two sets of lines and a plurality of switches to control them, Applicant disagrees with the Examiner's understanding of the remaining parts of the device. The reference shows a display signal control circuit receiving display data from a graphic controller, converting and correcting the display data based on the temperature and the current data and supplying address data to the scanning signal application circuit and converted/corrected display data to the data signal application circuit (column 9, lines 42-48). Thus, the reference teaches converting and correcting the display data based on the temperature data detected in the vicinity of the display panel and the current data detected in the data electrode. The reference does not teach or suggest changing the amount of current of the gate voltage to be applied to the gate line based on an ambient temperature. This differs from the present

invention where the current controller changes the amount of current or voltage in response to the change in ambient temperature. Further, the independent claims now require that the controller include a resistor and a thermistor which is not seen in the Katakura et al reference.

Also, although the Examiner has stated that the reference shows a charge characteristic compensating circuit, Applicant sees no statement of such use in the reference. The Examiner is requested to point out why he feels that this device compensates the charge characteristic of the panel. The Examiner does admit that this reference fails to show scan lines connected to gate lines to drive the LCD display.

The Examiner cited the Kikuo et al reference to show a teaching of gate lines and gate line driver connected to scan lines and scan line driver, respectively. However, even if these two references can be combined and even assuming that there is motivation to do so, although this has not been stated by the Examiner, Applicant submits that the present claims would not be obvious thereover.

As indicated above, there is not teaching that the reference shows a charge characteristic compensating circuit. Also, the references do not show a current controller which includes a resistor and thermistor. Further, the current controller does not change the amount of current in response to ambient temperature as noted above.

Claim 1 describes a compensating circuit having a combination of elements relating to a liquid display panel including a voltage supply for generating a gate voltage, a gate line driver for applying the gate voltage to gate lines and the current controller including a resistor and a thermistor for responding to the change in temperature to change the amount of current supplied to the driver. Very similar limitations are included in the other independent apparatus claims 6 and 9. Applicant

submits that these claims would not be obvious over this combination of references since the references do not teach the combination of resistor and thermistor that change the amount of current in response to the ambient temperature. In fact, Applicant submits that this combination of references teaches no more than is described as conventional art in Fig. 1. Thus, the specific construction of the current controller as presently defined in the claims is not seen in these references. The Examiner in regard to claim 2, states that Kikuo et al shows a resistor and thermistor connected in parallel between the voltage supply and gate line driver. However, the Applicant disagrees with the Examiner's understanding of the Kikuo et al reference. Column 13 describes the arrangement shown in Fig. 10 which does indeed include a resistor and thermistor arrangement. However, as indicated at Column 12, line 48, this arrangement shown in Fig. 10 relates to the device shown in Fig. 6 and that transistors T2 and T3 of Fig. 10 correspond to switches SW1 and SW2 of Fig. 6. This arrangement is used to establish positive and negative polarities for driving the display at various brightness levels. Thus, the temperature compensation in this reference is used to show the proper amount of brightness in the display rather than to compensate for the charge characteristic of the display. Accordingly, Applicant submits that the Katakura et al reference only teaches the general idea of using a resistor and thermistor connection as a temperature compensating circuit and does not in any way teach the use of these elements in a current controller and to change the amount of current of the gate voltage. Accordingly, Applicant submits that independent claims 1, 6 and 9 would not be obvious over this combination of references.

The dependent claims which depend from these allowable independent claims further recite other features such as the specific connection between the resistor and thermistor, whether the thermistor is a positive or negative temperature co-efficient and whether the controller uses a voltage

or current signal. Since the references do not show many of these features, Applicant submits that these claims are additionally allowable.

Claim 22 is a method claim which corresponds generally to the apparatus claims. This claim recites a combination of steps for compensating for a charge characteristic, including supplying and controlling voltage by way of a resistor and thermistor as the temperature varies and driving a gate line according to this signal. Applicant submits that this method is also not seen in the references since the references do not show the compensating for charge characteristic and the use of a resistor and thermistor to vary a controlling signal. Likewise, claims 23 to 26 which depend therefrom are also allowable.

In regard to claims 4, 11, 13 and 24 the Examiner cites Marks et al (5,119,215) reference to show that a thermistor may have a positive temperature co-efficient. However, even if this is true, it does not aid the other references in overcoming their deficiencies as noted above.

Likewise, claims 20 and 21 further relied on the Noma et al (6,184,631) reference to show the voltage divider having the specific connection between the thermistor and the input into the end gate line driver and ground. However, Applicant submits that these claims are likewise allowable based on their dependency. Also, Applicant submits that it would not be obvious to include this additional reference in the combination without motivation. Accordingly, these claims are additionally allowable.

CONCLUSION

In view of the above remarks, it is believed that the claims clearly distinguish over the patents relied on by the Examiner either alone or in combination. In view of this, reconsideration of the rejection and allowance of all the claims are respectfully requested.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert F. Gnuse (Reg. No. 27,295) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

Attached hereto is a marked-up version of the changes made to the application by this Amendment.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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2658-0251P

Attachment: Version with Markings to Show Changes Made
Abstract

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE ABSTRACT:

The Abstract has been amended as follows:

ABSTRACT

A charge characteristic compensating circuit for a liquid crystal display panel [that is capable of] for maintaining a charge characteristic of the liquid crystal display panel independently of ambient temperature change to prevent deterioration of images displayed. A [In the circuit, a] plurality of liquid crystal cells [are arranged at each intersection between data lines and gate lines to] control light transmission in response to data signals from the data lines. A plurality of thin film transistors switch the data signals [to be applied] from the data lines to the liquid crystal cells in response to signals on the gate lines. A voltage supply generates a gate voltage required for the gate lines. A gate line driver applies the gate voltage from the voltage supply to the gate lines to drive the gate lines. A gate line controller responds to a change in the ambient temperature to vary a controlling signal applied to the gate line driver.

IN THE CLAIMS:

Claims 1-3, 6, 7, 9, 12, 14, 17, 19 and 22 have been rewritten as follows.

1. (Amended) A charge characteristic compensating circuit for a liquid crystal display panel including a plurality of liquid crystal cells arranged at each intersection between data lines and gate lines to control a light transmissivity in response to data signals from the data lines, and a plurality of

switching devices for switching the data signals to be applied from the data lines to the liquid crystal cells in response to signals on the gate lines, the circuit comprising:

a voltage supply for generating a gate voltage required for the gate lines;

a gate line driver for applying the gate voltage from the voltage supply to the gate lines to drive the gate lines; and

a current controller including a resistor and a thermistor for responding to a change in the ambient temperature to change an amount of current of the gate voltage to be applied from the voltage supply to the gate line driver.

2. (Amended) The charge characteristic compensating circuit as claimed in claim 1, wherein [the current controller includes a] said resistor and [a] said thermistor are connected, in parallel, between the voltage supply and the gate line driver.

3. (Amended) The charge characteristic compensating circuit as claimed in claim 1, wherein [the current controller includes a] said resistor and [a] said thermistor are connected, in series, between the voltage supply and the gate line driver.

6. (Amended) A charge characteristic compensating circuit for a liquid crystal display panel including a plurality of liquid crystal cells arranged at each intersection between data lines and gate lines to control a light transmissivity in response to data signals from the data lines, and a plurality of switching devices for switching the data signals to be applied from the data lines to the liquid crystal cells in response to signals on the gate lines, the circuit, comprising:

a voltage supply for generating a gate voltage required for the gate lines;

a gate line driver for applying the gate voltage from the voltage supply to the gate lines to drive the gate lines; and

a current controller including a resistor and a thermistor for responding to a change in the ambient temperature to change a voltage level of the gate voltage to be applied from the voltage supply to the gate line driver.

7. (Amended) The charge characteristic compensating circuit as claimed in claim [5] 6, wherein the current controller includes a resistive voltage divider connected between the voltage supply and the gate line driver and composed of [a] said resistor and [a] said thermistor.

9. (Amended) A charge characteristic compensating circuit for a liquid crystal display panel (LCD), comprising:

a voltage converter generating a high level gate voltage;

a gate line controller including a resistor and a thermistor receiving said high level gate voltage from said voltage converter and supplying a controlling signal that varies as an ambient temperature varies; and

a gate line driver receiving said controlling signal from said gate line controller and driving a gate line.

12. (Amended) The charge characteristic compensating circuit of claim 11, wherein said current controller includes [a] said thermistor.

14. (Amended) The charge characteristic compensating circuit of claim 13, wherein said current controller further includes [a] said resistor such that said resistor is in one of a parallel connection or a serial connection with said thermistor.

17. (Amended) The charge characteristic compensating circuit of claim 16, wherein said [current controller] voltage divider includes [a] said thermistor.

19. (Amended) The charge characteristic compensating circuit of claim 18, wherein said voltage divider further includes [a] said resistor such that said resistor is connected between said voltage converter and an input to said [said] gate line driver and said negative temperature coefficient thermistor is connected between ground and said input to said gate line driver.

22. (Amended) A method to compensate for a charge characteristic of a liquid crystal display panel (LCD), comprising:

supplying a controlling signal that varies by way of a resistor and thermistor as an ambient temperature varies; and

driving a gate line according to said controlling signal.